**U.S. NRC Nuclear Education Grant Program at The Ohio State University – Application of Full-Scope Nuclear Power Plant Simulator in Nuclear Engineering Courses**

**Executive Summary**

Full-scope nuclear power plant simulators are full-size duplicates of actual nuclear power plant control rooms nearly indistinguishable from real control rooms. They are required by NRC for training and examining of licensed operator candidates, crews consisting of licensed operators, and other plant personnel. These large simulators are driven by complex sets of computer software that provide a high fidelity representation of actual plant behavior in real time as trainees and operators make control panel switch position manipulations. The whole plant is modeled, from the reactor core to the electrical grid. The neutronics and thermal hydraulic codes are state-of-the-art. The secondary plant, auxiliary systems, AC and DC electrical systems, and emergency systems are all modeled. In recent years, most simulator software has transitioned to a Windows environment where they are run on the latest and most powerful Windows-based servers. Extra functions and graphics have been developed to enable instructors to monitor plant operating parameters in much greater detail than actual plant instrumentation. Additionally, plant drawings and touch-screen active control panel mimics have been developed to enable instructors to use a computer screen to control plant functions. The displays are typically multi-screen and allow duplication of control room panels as necessary. These advances have enabled nuclear power plant training departments to move the simulator model away from the hardware control room mimic into a classroom, extending their ability to have more simulator time with plant operators. It is this latter simulator implementation we propose to install at The Ohio State University and to design and incorporate hands-on simulator operations into existing courses and one new course.

Due to having taught two nuclear power plant operations courses for more than 15 years, and having a faculty very oriented to nuclear power operations, the Ohio State Nuclear Engineering Program is uniquely qualified to make use of hands-on simulator experiences for students in its courses. The expected products of this project are: 1) the porting of existing software to a Windows Server environment for several plant systems, including panel graphics and the underlying operations coding to enable students to perform system operations related to and to enhance applications in several Nuclear Engineering courses, and 2) design of a new human reliability course with integrated simulator components. This project will provide increased industry relevance for our courses, the increased learning opportunity for our students due to hands-on experiences, and the ability to experiment with safety and human factors aspects within a simulated environment with a high degree of fidelity.

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